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TRANSFER AND GENERALIZATION IN INDIVIDUALLY PRESCRIBED INSTRUCTION.

BY- LIPSON, JOSEPH
PITTSBURGH UNIV., PA., LEARNING RES. AND DEV. CTR.

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THE PROBLEM OF THIS RESEARCH WAS TO STUDY THE EXTENT TO WHICH STUDENTS ARE ABLE TO GENERALIZE WHAT THEY LEARN IN ONE LESSON SO THAT THEY ACTUALLY GAIN COMMAND OF ABILITIES NOT SPECIFICALLY TAUGHT UNTIL SOME LATER LESSON. THE AUTHOR EXAMINED CONDITIONS UNDER WHICH A MASTERY SCORE ON A PRETEST IN ARITHMETIC COULD BE CONSIDERED A TRANSFER INSTANCE. DATA ON TRANSFER INSTANCES WERE COMPILED AND EXAMINED, AND THE USES OF THIS INFORMATION WERE DISCUSSED. IT WAS SUGGESTED THAT SUCH INFORMATION COULD BE USED IN THE FIELD OF INSTRUCTIONAL DESIGN, SPECIFICALLY, IN REVISING TEACHING OBJECTIVES AND MATERIALS TO PROMOTE GENERALIZATION AND TRANSFER ABILITIES. RELATED REPORTS ARE ED 010 205 THROUGH ED 010 211 AND ED 010 519 THROUGH ED 010 523. (GD)

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UNIVERSITY OF PITTSBURGH - LEARNING R&D CENTER

WORKING PAPER 5

TRANSFER AND GENERALIZATION IN INDIVIDUALLY PRESCRIBED INSTRUCTION

JOSEPH I. LIPSON

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TRANSFER AND GENERALIZATION IN INDIVIDUALLY PRESCRIBED INSTRUCTION

Joseph Lipson

Learning Research and Development Center
University of Pittsburgh

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TRANSFER AND GENERALIZATION IN INDIVIDUALLY PRESCRIBED INSTRUCTION

Joseph I. Lipson

In a program in which pupils proceed at individual rates through a sequenced series of lessons, an important consideration is the extent to which pupils are able to generalize what they learn in one lesson so that they actually gain command of abilities not specifically taught until some later lesson. This ability in students and the quality of certain lessons which tends to enhance this type of generalization or transfer are important determinants of pupil progress.

In this talk generalization is defined as the successful completion of a problem which is an extension or extrapolation of previously mastered instances. For example, if a student who has received instruction in addition with carrying to the ten's place then displays mastery of addition to the hundred's or thousand's place, he is generalizing. Transfer is defined as the solution of a new problem which may have common elements with previous learning, but a problem in which the basic procedure or method of solution is not immediately apparent. Thus a student who displays mastery of the process of carrying in addition when he has previously only learned to count to -- say -- 100 is displaying transfer of training since the addition with carrying is implicit in counting, but not as any obvious extension of the counting process.

First I shall examine the conditions under which a mastery score

on a pre-test in arithmetic is considered to be a transfer instance; second, I shall examine some of the data of transfer instances, and finally I shall discuss the use made of this information.

As Dr. Glaser has mentioned, the arithmetic curriculum is specified by about 385 behavioral objectives which are grouped into 85 units of study. The main theme of each unit is listed in Table 1. The units are arranged by subject area: Numeration, Place Value, Addition, Subtraction, Multiplication, Division, etc. Each subject area is then divided into a sequence of complexity by levels which are arbitrarily called A, B, C, D, E, F, G, and H. Thus each area is completed at the A level and then returned to at the B level after intervening instruction in other areas, etc. in the usual fashion of elementary school arithmetic.

Before entering any unit of study -- say D-Multiplication which involves multiplication as repeated addition and memorizing the tables through 5 x 5 -- the student is given a pre-test. A certain score is specified which defines mastery of the material covered by the test. Usually this score is 80 - 85% of the total score points available.

We can divide the cases in which mastery is shown on a pre-test into two categories. Either the student has had instruction in the pre-requisite skills in the subject area or he has not had such instruction. In the cases where no instruciton has been recorded, he may have learned the subject objectives before he entered the program. Thus the instances chosen as indicators of transfer are those for which the student has received instruction in pre-requisite skills and then shows mastery in advanced dependent skills. This model is diagramed in Table 3. All the instances which fit this model are called <u>transfer instances</u>.

These transfer instances can be used as a comparative measure of transfer; that is, if the number of instances which fit the model increases, then transfer has increased. Or if certain units of study have a higher percentage of transfer instances, then transfer is more probable in these units than in units with a lower percentage. Since no attempt was made to make units of equal difficulty, the latter statement does not imply that interpretation is easy.

We conclude that the probability of transfer increases as the student's background in arithmetic increases. This inference is drawn from table 7 which presents the number of transfer instances by grade and the mean number of transfer instances per pupil.

Table 8 presents the transfer instances by subject area. If we total the instances by subject area, the general observation can be made that addition and subtraction with 44 instances show greater probability of transfer than multiplication and division with only two transfer instances. Table 9 compares the frequencies of different categories of mastery in each subject area. The total number of times a unit has been mastered is compared to the number of times the unit has been mastered on a pre-test and to the number of times that pre-test mastery has met the criteria for a transfer instance. For example, D-addition, encircled in red in table 9, was mastered 64 times. Twenty-nine times mastery was shown on a pre-test, and 19 instances occured when pre-test mastery met the model for transfer. By comparison, of the 50 students who mastered E-multiplication (boxed in black) only 7 students passed the pre-test and only 1 student was able to show transfer from instruction at a lower level to the objectives of E-multiplication (simple multiplication with carrying). The conclusion I draw is that the algoritnms of multipli-

cation and division are too difficult for the student to learn without specific instruction. At least this is true with the preparation currently being provided.

The question arises, "What percentage of the students in a class show the transfer behavior." Table 10 answers this question. Table 10 presents the number of students in each class who showed transfer instances and the percentage of the students in the class who showed transfer instances. The increase in the number and percentage with class again suggests that transfer is more likely as the student builds a repertoire in arithmetic.

We hope to use the information provided by analysis of performance to revise our objectives and materials in order to promote generalization and transfer. However, it is probable by the very nature of individual differences that some students will always need instruction in each of the units of the program. At any rate, this feedback of student performance into the continuing revision of instructional materials and instructional practice is one of the most important uses of the data which the individualized program generates. There are many dimensions along which analysis can take place in order to guide the lesson writer.

The other tables in the handout which have not been specifically referred to are provided to give perspective and background to the information on transfer instances.

TABLE 1a

A Short Description of Mathematics Units

PART ONE

1. A Numeration - Counting to ten.
2. A Addition - Addition to sums of six with pictured objects.
3. A Fractions - Identification of 1/2 of objects and small sets.
4. A Money - Recognition of common coins (penny, nickel, dime).
5. A Time - The day as a unit of time.
6. A Systems of Measurement - Qualitative dimensional discrimination by verbal directions.
7. A Geometry - Recognition of simple geometric figures.
8. B Numeration - Counting to 100. Use of ordinals to 10th.
9. B Addition - Addition to sums of 10.
10. B Money - Beginning money equivalents (5¢ = 1 nickel).
11. B Time - Clock reading to the hour.
12. B Ysytems of Measurement - Beginning equivalent length (3 ft. = 1 yd.).
13. B Geometry - Draws simple geometric figures.
14. C Numeration - Counting to 150.
16. C Addition - Two digit sums without carrying but with expanded notation.
17. C Subtraction - Two digit differences without carrying but with expanded notation.
18. C Combination of Processes - Word problems with skills learned to this point plus selection of proper operation to solve problems.
19. C Fractions - With fractions to 1/4 divides single objects and groups of objects.
20. C Money - Practical use of penny, nickel, dime, and quarter.
21. C Time - Solves problems requiring addition or subtraction of hours.
22. C Systems of Measurement - Converts units: inches - feet, pint - quart - cup, dozen - 1/2 dozen.
23. C Geometry - Recognizes and names solid geometric figures.

TABLE 1b

A Short Description of Mathematics Units

PART TWO

24. C Special Topics - Reads Roman numerals, to 10; reads thermometer; reads charts and graphs.
25. D Numeration - Counting to 1,000 (reading and writing numerals with skip counting).
26. D Place Value - Makes and reads place value charts to thousands.
27. D Addition - Begins addition with carrying.
28. D Subtraction - Begins subtraction with borrowing.
29. D Multiplication - Does multiplication as repeated addition. Memorizes tables through 5 x 5.
30. D Division - Does division as partition, inverse to addition, and memorizes tables through 25 divided 5.
31. D Combination of Processes - Solves problems requiring selection and discrimination of many processes.
32. D Fractions - Applies fractional concepts (2/3, 3/4) to objects and groups. Begins formal operations (1/2 x 8 = ?).
33. D Money - Operates with money values to $5.00.
34. D Time - Tells time to the minute and uses time in problems.
35. D Systems of Measurement - Extends linear and volume systems and begins metric system with centimeters.
36. D Geometry - Identify open versus closed curves, line segments versus lines.
37. D Special Topics - Reads Roman numerals to 30.
38. E Numeration - Identifies odd versus even numbers; rounds & estimates numbers.
39. E Place Value - Uses place value to millions; begins exponents of base 10.
40. E Addition - Performs addition with carrying to thousands.
41. E Subtraction - Does subtraction with borrowing to hundreds.
42. E Multiplication - Does multiplication as repeated addition. Uses associative and distributive principle and does simple multiplication with carrying.
43. E Division - Uses ladder algorithm for division.
44. E Combination of Processes - Solves using n as variable. Does operations with competing processes.
45. E Fractions - Identifies equivalent fractions; adds fraction with a common denominator.

TABLE 1c

A Short Description of Mathematics Units

PART THREE

46. E Money - Adds and subtracts money values using decimal notation.

47. E Time - Uses seconds in time problems.

48. E Systems of Measurement - Adds and subtracts measures by regrouping when necessary.

49. E Geometry - Identifies simple line figures (equilateral triangle, quadrilateral, parallel lines, midpoint, end points, right angle, intersecting lines, perpendicular lines.)

50. E Special Topics - Uses simple maps.

51. F Numeration - Uses large numbers, identifies prime numbers, performs operations in base five.

52. F Place Value - Manipulates exponents to ten cubed.

53. F Addition - Adds negative numbers, large sums.

54. F Subtraction - Subtracts negative numbers.

55. F Multiplication - Uses multiplication algoritjms with 3 digit numbers.

56. F Division - Uses division algorithm with no remainders; does simple division with remainders.

57. F Combination of Processes - Computes averages; performs multiple operations with common pairs of numbers, (add, subtract, multiply, divide using 90_31).

58. F Fractions - Adds, subtracts fractions with unlike denominators.

59. F Money - Multiplies and divides money values.

60. F Time - Adds in time problems extending over 12:00. Interprets decade, century, score, fortnight.

61. F Geometry - Assorted topics (area, perimeter, bisection, ray, parts of circle, volume, meters, vertex.)

62. F Special Topics - Ratio, percent, function rule.

63. G Numeration - Uses prime numbers to factor composite numbers. Performs operations in bases 3, 7, and 5.

64. G Place Value - Charts large numbers by place value.

65. G Addition - Adds decimal numbers to thousandths, positive and negative numbers; adds with positive numbers of ten.

66. G Subtraction - Subtracts negative and positive numbers, subtracts with positive powers of ten.

67. G Multiplication - Multiplies using positive powers of ten.

TABLE 1d

A Short Description of Mathematics Units

PART FOUR

68. G Division - Divides with remainders as fractions, using positive powers of ten, decimal numbers, negative numbers.
69. G Combination of Processes - Solves word problems with skills learned.
70. G Fractions - Adds fractions with common denominator algorithm, multiplies fractions.
71. G Time - Uses schedules and 24 hour clock.
72. G Geometry - Calculates circumference, perimeters, areas.
73. G Special Topics - Draw graphs of ordered pairs, uses Venn diagrams for intersection and union.
74. H Numeration - Performs operations in base 2 and base 12.
75. H Place Value - Makes place value charts in other number bases.
76. H Addition - Adds with negative powers of ten.
77. H Subtraction - Subtracts using negative powers of ten.
78. H Multiplication - Multiplies with decimals, with negative numbers, with negative powers of ten.
79. H Division - Divides decimal numbers, positive and negative numbers, using negative powers of ten. Calculates square roots.
80. H Combination of Processes - Solves word problems with skills learned.
81. H Fractions - Multiplies and divides fractions; interprets fractional powers of whole numbers.
82. H Time - Identifies time zones and converts with daylight saving time.
83. H Systems of Measurement - Converts with linear metric measurements.
84. H Geometry - Interprets congruent angles, calculates volumes.
85. H Special Topics - Identifies irrational numbers; follows logic sequence in equations.

TABLE 2

NUMBER OF MATHEMATICS UNITS MASTERED BY OAKLEAF CHILDREN

Grade	A Number Of Units	B Number of Children In Class	C=A÷B Mean Units Per Pupil
First	209	30	7.0
Second	316	28	11.3
Third	483	31	15.6
Fourth	337	26	13.0
Fifth	282	21	13.4
Sixth	309	23	13.4
TOTAL	1,936	159	12.2

TABLE 3

MODEL FOR INSTANCE WHICH INDICATES THAT GENERALIZATION AND TRANSFER HAVE TAKEN PLACE

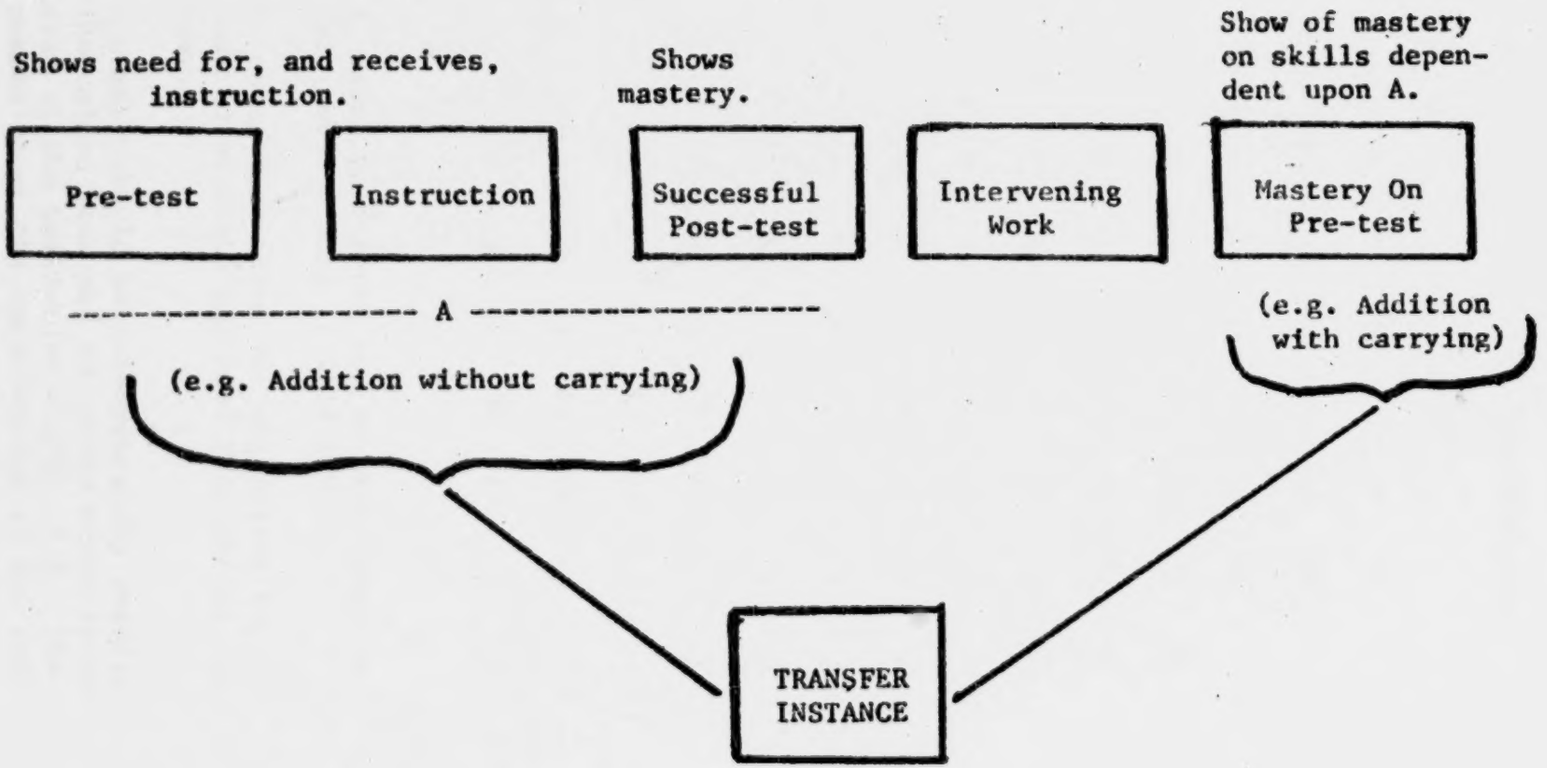


TABLE 4

Units mastered in arithmetic listed by subject area and by complexity level.

	Level						
	A	B	C	D	E	F	G
Numeration	25	45	52	61	43	10	-
Place Value	x	x	87	64	53	12	-
Addition	2	45	60	64	30	23	6
Subtraction	x	x	70	60	36	20	4
Multiplication	x	x	x	39	50	12	5
Division	x	x	x	42	26	6	2
Combination of Processes	x	x	62	48	28	3	2
Fractions	-	x	56	55	24	6	1
Money	11	16	33	40	14	1	x
Time	7	13	41	50	18	-	7
Systems of Measurement	-	35	55	49	25	-	-
Geometry	3	8	25	48	25	-	-
Special Topics	x	x	38	30	17	-	-

Explanation of symbols:

x means that there are no objectives in this subject area at this level.

- means that there are objectives but that no students mastered them during the year.

A number should be interpreted by reading the column head and row title which intersect at the particular number, e.g. The number 45 at the intersection of the column B and the row beside Addition means that 45 students completed the unit called B-Addition (see table 1a).

TABLE 5

NUMBER OF PRETESTS MASTERED IN MATHEMATICS

Grade	A Number of Pre-Tests Mastered	B Number of Children in Class	C=A÷B Mean Number of Pre-tests Per Child in Class
First	54	30	1.8
Second	124	28	4.4
Third	189	31	6.1
Fourth	137	26	5.3
Fifth	116	21	5.5
Sixth	135	23	5.9
TOTAL	755	159	4.7

TABLE 6

Number of Math Units With Mastery Shown on Pre-test, by Subject Area And Level of Complexity

	A	B	C	D	E	F	G
Numeration	13	7	9	25	9	-	-
Place Value	x	x	44	35	14	-	-
Addition	2	3	1	29	22	3	-
Subtraction	x	x	12	4	20	7	1
Multiplication	x	x	x	5	7	-	-
Division	x	x	x	10	4	1	-
Combination of Processes	x	x	52	16	13	1	1
Fractions	-	x	10	4	10	-	1
Money	11	13	18	11	7	-	x
Time	7	7	4	4	8	-	7
Systems of Measurement	-	12	25	2	14	x	x
Geometry	3	8	5	21	1	-	-
Special Topics	x	x	11	37	11	-	-

(Same explanation as Table 4)

TABLE 7

Number of Transfer Instances in Mathematics

1964-65

Grade	A Number Of Units	B Total Number Of Students In the Class	C = A B Mean Number of Transfer Instances Per Pupil In Class
One	7	30	.23
Two	8	28	.28
Three	18	31	.58
Four	23	26	.88
Five	22	21	1.04
Six	21	23	.91
TOTAL	99	159	.62

TABLE 8

Number of Transfer Instances by Subject Area And Level.

Mathematics Pre-tests Mastered 1964-65

(After Work in Lower Level of the Same Subject Area.)

	Level					
Unit	B	C	D	E	F	G
Numeration	-	3	2	2	-	-
Place Value	x	x	2	-	-	-
Addition	x	-	19	3	1	4
Subtraction	x	x	5	10	1	1
Multiplication	x	x	x	1	-	-
Division	x	x	x	1	-	-
Combination of Processes	x	x	1	5	-	-
Fractions	x	x	1	8	-	1
Money	x	2	1	1	-	x
Time	x	-	-	7	-	x
Systems of Measurement	x	2	2	6	x	x
Geometry	x	x	3	-	-	-
Special Topics	x	-	3	-	-	x

Explanation of symbols:

x means that a transfer instance was not possible in this unit.

\- means that no transfer instance occured.

TABLE 9

Different Categories of Unit Mastery by Subject Area And By Level of Complexity

a) total no. b) mastered on pre-test c) transfer instances

	A 25/13/x	B 45/7/0	C 52/9/3	D 61/25/2	E 43/9/2	F 10/0/0	G -
Numeration							
Place Value	x	x	87/41/1	64/35/2	53/14/0	12/0/0	-
Addition	2/2/x	45/3/0	60/1/0	64/29/19	30/22/3	23/3/1	6/4/4
Subtraction	x	x	70/12/0	60/4/5	36/20/10	20/7/1	4/1/1
Multiplication	x	x	x	39/5/0	50/7/1	12/0/0	5/0/0
Division	x	x	x	42/10/0	26/4/1	6/1/0	2/0/0
Com. of Proc.	x	x	62/52/0	48/16/1	28/13/5	3/1/0	2/1/0
Fractions	-	x	56/10/0	55/4/1	24/10/8	6/0/0	1/1/1
Money	11/11/x	16/13/0	33/18/2	40/11/1	14/7/1	1/0/0	x
Time	7/7/x	13/7/0	41/4/0	50/4/0	18/8/7	-	7/7/0
Syst. of Meas.	-	35/12/0	55/25/2	49/2/2	25/14/6	x	x
Geometry	3/3/x	8/8/0	25/5/0	48/21/3	25/1/0	-	-

TABLE 9a

Explanation of symbols: Let the numbers be a/b/c. The first number (a) represents the total number of units passed. The second number (b) represents the number of units passed by pre-test. The third number (c) represents the number of transfer instances. An x represents a place where there are no units for that category. A - means that there were objectives but no units mastered during the year. When a - b = 0, c at the next level should be zero because there were no students who received instruction from which to show transfer. e.g. The last number in C- Geometry is zero because there were no students at level B who received instruction.

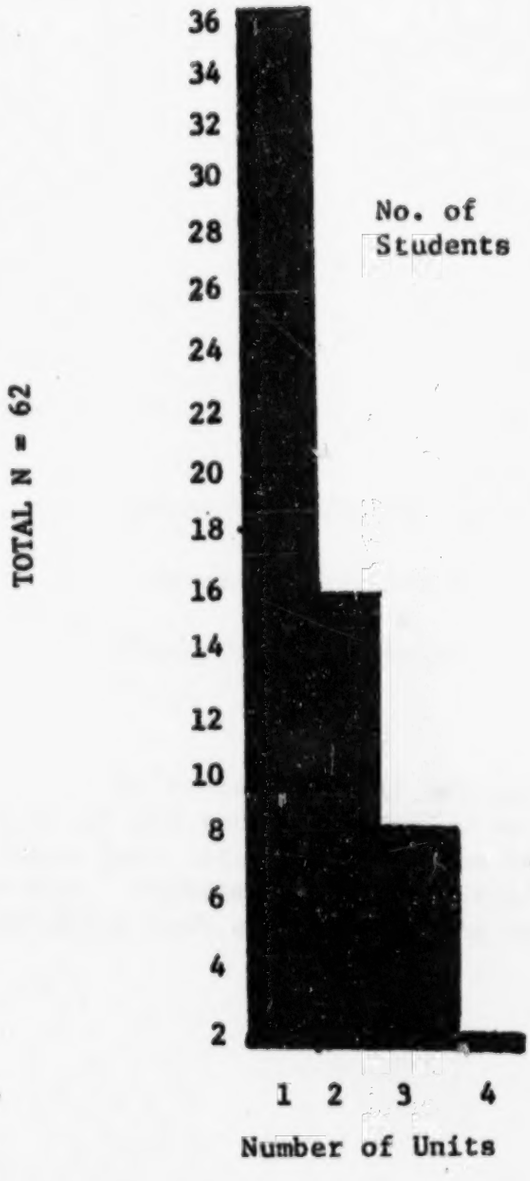
TABLE 10

Number of Children by Grade Responsible
For Transfer of Instances.
99 Pretests Mastered in Mathematics 1964-65
(After Work in Lower Level of Same Subject Area.)

Grade	A Number of children in class who showed transfer instances	B Total Number of Students	C = A ÷ B Fraction of Students who Showed Transfer
One	4	30	.13
Two	6	28	.21
Three	14	31	.45
Four	12	26	.46
Five	12	21	.57
Six	14	23	.61
TOTAL	62	159	.39

TABLE 11

NUMBER OF TRANSFER INSTANCES IN MATHEMATICS



To be read, "Thirty-six students showed transfer in only one unit. Sixteen students contributed two transfer instances each. Nine students had three transfer instances and one student had four transfer instances.

TABLE 12a

Transfer Instances
in
Grade One

IQ	Student's Initials	Test Scores for Transfer Instances		
139	L.C.	B Num. 68/94 C Num. 84		
119	J.C.	B Num. 78/92 C Num. 86	C PV 70/85 D PV 95	B Money 67/100 C Money 85
131	J.K.	C Add. 55/78/78/83 D Add. 88	B Money 78/93 C Money 90	
100	P.W.	B Num. 70/86 C Num. 92		

TOTAL TRANSFER INSTANCES = 7

4 Students accounted for these 7 instances

Class of 30 Students

To be read (Using 1st example on 12a): Student L.C. with an I.Q. of 139 received a below mastery score of 68% on the B-Num (See Table 1a). After instruction he received a mastery score of 94% in B-Num. Sometimes later he received a mastery score of 84% in the advanced work of C-Num. (See Table 1a.)

TABLE 12b

Transfer Instances
in
Grade Two

IQ	Student's Initials	Test Scores for Transfer Instances	
105	J.A.	C Add. 68/88 D Add. 90	C Sub. 52/100 D Sub 92
123	L.B.	C Num. 78/82 D Num. 93	
111	C.B.	C Num. 50/92 D Num. 93	
115	K.K.	B SOM 67/83 C SOM 85	
131	K.K.	C Add. 55/93 D Add. 94	
126	D.P.	C PV 75/75/90 D PV 90	C Add. 33/85 D Add. 98

TOTAL TRANSFER INSTANCES = 8

6 Students accounted for these 8 instances

Class of 28 Students

TABLE 12c

Transfer Instances
in
Grade Three

IQ	Student's Initials	Test Scores for Transfer Instances		
131	J.B.	D Num. 80/98	C Add. 65/78/98	C Sub. 74/96
		E Num 92	D Add. 92	D Sub. 87
		C ST 60/92		
		D ST 96		
109	R.C.	C ST 68/92		
		D ST 88		
123	C.D.	C Add. 75/80		
		D Add. 96		
126	J.F.	C St 20/96		
		D St 96		
138	T.G.	C Add. 65/85		
		D Add. 88		
119	K.K.	C Add. 43/83		
		D Add. 100		
121	J.K.	C Add. 63/83		
		D Add. 90		
112	D.L.	C Add. 73/75/95		
		D Add. 84		
134	R.P.	C Add. 63/80	C Sub. 58/96	
		D Add. 100	D Sub. 86	
115	D.P.	C Add. 55/58/73/98		
		D Add. 96		
127	D.S.	C Add. 65/90		
		D Add. 92		
	B.S.	D Sub. 65/90		
		E Sub. 98		
107	L.S.	C Add. 58/73/90		
		D Add. 94		
117	J.W.	C Add. 55/78/98		
		D Add. 88		

TOTAL = 18 transfer instances

14 Students accounted for these 18 instances ---------- class of 31 students

TABLE 12d

TRANSFER INSTANCES
in
Grade Four

IQ	Student's Initials	Test Scores for Transfer Instances		
128	S.A.	D Sub. 73/100 E Sub. 98	D COP 77/97 E COP 86	D Time 64/86 E Time 95
112	L.C.	C Sub. 40/100 D Sub. 86		
96	R.D.	D Num. 60/93 E Num. 91	D Add. 70/88 E Add. 84	C Frac.79/99 D Frac.96
131	J.D.	D Frac. 28/60/100 E Frac. 85	D Time 68/80 E Time 90	D SOM 24/94 E SOM 97
117	D.F.	B SOM 83/92 C SOM 85		
125	R.H.	D Add. 80/? E Add. 93	D Sub. 63/100 E Sub. 84	
119	N.M.	D Sub. 81/99 E Sub. 90	C Geom.67/93 D Geom.96	
102	J.M.	C Add. 30/95 D Add. 94		
113	W.M.	C Sub. 46/40/92 D Sub. 95		
117	S.M.	C COP 80/100 D COP 89	C Geom.73/73/? D Geom.84	
121	C.M.	D Mul. 60/100 E Mul. 90	D Time 74/82/86 E Time 85	
123	M.W.	C Add. 83/? D Add. 96	D Sub. 73/99 E Sub. 92	

TOTAL = 23 transfer instances

12 Students accounted for these 23 instances

Class of 26 students

TABLE 12e

TRANSFER INSTANCES
in
Grade Five

IQ	Student's Initials	Test Scores for Transfer Instances		
121	J.A.	D Sub. 77/91 E Sub. 94		
97	P.B.	D COP 60/91 E COP 96	D Time 64/86 E Time 90	D SOM 62/90 D SOM 93
108	N.K.	C SOM 75/100 D SOM 86		
115	B.K.	D COP 63/83 E COP 91	D Frac.76/80 E Frac.90	D SOM 60/90 E SOM 90
130	G.K.	D COP 77/97 E COP 86	D Frac.72/100 E Frac.85	
124	D.K.	D Frac.76/96 E Frac.88	D COP 60/100 E COP 86	C Money95/100 D Money91
100	K.K.	D Sub. 64/100 E Sub. 96		
122	K.K.[1]	D SOM 66/84 E SOM 87		
132	L.K.	D Sub. 71/92 E Sub. 90	D Div. 64/84 E Div. 84	
107	S.M.	D Add. 78/100 E Add. 100	C Geom 53/87 D Geom 100	D Sub. 60/94 E Sub. 94
120	G.S.	D Frac 72/72/72/92 E Frac 90		
109	L.W.	D Sub. 86/? E Sub. 96		

TOTAL units = 22

12 students

Class of 21 students

TABLE 12f

TRANSFER INSTANCES
in
Grade Six

IQ	Student's Initials	Test Scores for Transfer Instances		
124	B.B.	F Add. 74/82 G Add. 100	F Frac. 66/90 G Frac. 86	D Time 74/94 E Time 85
122	F.B.	D SOM 66/88 E SOM 93		
93	R.C.	D Frac.52/72 E Frac.88		
118	E.D.	F Add. 78/84 G Add. 85		
123	G.G.	F Add. 64/72/96 G Add. 100		
127	J.G.	E Add. 80/83 F Add. 84	D Frac. 72/80 E Frac. 98	
83	J.K.	C Add. 55/90 D Add. 92		
121	M.M.	D SOM 74/84 E SOM 97		
110	J.M.	D Sub. 76/100 E Sub. 98 F Sub. 84		
62	H.P.	C Add. 70/98 D Add. 86		
112	J.R.	D Frac 44/64/100 E Frac 93	D Money 76/95 E Money 96	
123	A.S.	D Time 78/88 E Time 85	D SOM 64/86 E SOM 97	
113	N.S.	D Time 64/82 E Time 90		
132	D.W.	F Add. 70/90 G Add. 85	F Sub. 65/85 G Sub. 93	

TOTAL = 21 units
14 students
Class of 23 students